[Geochemical Analysis & Lab]

EXPERIMENT 6: Theoretical Calculation of Carbonate Concentrations from Alkalinity

**Preparation**:

* pH and Alkalinity values measured in the previous experiment
* Calculator

**Procedures:**

1. Convert the measured alkalinity in mg CaCO3/L to eq/L using the following equations:

Alkalinity (in eq/L (Normality)) = Alkalinity (in mg CaCO3/L) / 50,000

1. Let CT be total carbonate,

CT = [H2CO3] + [HCO3-] + [CO32-]. (1)

where [] represents molarity. Then the, fractions become

(2)

(3)

(4)

When the equilibrium constants for the following reactions are given as below:

H2CO3 = H+ + HCO3- , (5)

HCO3- = H+ + CO32- , (6)

plot 1,2,and 3 as a function of pH (plot  vs pH)

1. Assuming that the carbonate and OH- are the only significant dissolved components for the alkalinity of your sample, the alkalinity calculated in Problem 1 can be expressed as

Alkalinity (in eq/L) = [HCO3-] + 2[CO32-] + [OH-]

= CT (2 23) + Kw /10-pH, (7)

where Kw = 10-14.

Use the measured pH and alkalinity, equations (2), (3), (4), (5), (6), and (7) to calculate CT and then, the molarities of H2CO3,HCO3-, and CO32- ([H2CO3], [HCO3-], and [CO32-]).

1. Convert [H2CO3], [HCO3-], and [CO32-] calculated in Problem 3 to mg/L and discuss the results.

**Notes:**